

Claims

What is claimed is:

- 1 1. A scheduling method for implementing peak service distance
2 (PSD) using a next peak service distance time violated (NPTV) indication
3 comprising the steps of:
4 identifying a flow scheduled on a best effort or weighted fair queue
5 (WFQ) for servicing and dispatching a frame from said identified flow;
6 checking for a next PSD time (NPT) for said flow being violated;
7 responsive to identifying said next PSD time (NPT) being violated for
8 said dispatched flow, setting a NPTV indicator;
9 responsive to identifying said next PSD time (NPT) not being violated
10 for said dispatched flow, resetting said NPTV indicator;
11 calculating a next PSD time (NPT) value for said flow;
12 checking for more frames to be dispatched from said flow; and
13 responsive to identifying no more frames to be dispatched from said
14 flow, utilizing said NPTV indicator to identify a calendar for attaching said
15 flow upon a new frame arrival for said flow.
- 1 2. A scheduling method for implementing peak service distance
2 as recited in claim 1 wherein the step of checking for a next PSD time (NPT)
3 for said flow being violated includes the steps of comparing a current time of
4 said frame being dispatched with a current NPT value for said flow;
5 identifying said next PSD time (NPT) not being violated for said dispatched
6 flow responsive to said current time being greater than or equal to said
7 current NPT value for said flow; and identifying said next PSD time (NPT)
8 being violated for said dispatched flow responsive to said current time being
9 less than said current NPT value for said flow.
- 1 3. A scheduling method for implementing peak service distance
2 as recited in claim 1 includes the steps responsive to identifying said next
3 PSD time (NPT) being violated for said dispatched flow and identifying more
4 frames to be dispatched from said flow, attaching said flow to a peak
5 bandwidth service (PBS) calendar.

1 4. A scheduling method for implementing peak service distance
2 as recited in claim 1 includes the steps responsive to identifying said next
3 PSD time (NPT) not being violated for said dispatched flow and identifying
4 more frames to be dispatched from said flow, attaching said flow to a
5 weighted fair queue (WFQ) ring.

1 5. A scheduling method for implementing peak service distance
2 as recited in claim 1 wherein the step responsive to identifying no more
3 frames to be dispatched from said flow, of utilizing said NPTV indicator to
4 identify said calendar for attaching said flow upon said new frame arrival for
5 said flow includes the steps of checking for said NPTV indicator being set,
6 and responsive to said NPTV indicator not being set, attaching said flow to a
7 weighted fair queue (WFQ) ring.

1 6. A scheduling method for implementing peak service distance
2 as recited in claim 5 wherein the step of attaching said flow to said weighted
3 fair queue (WFQ) ring includes the step of calculating a queue distance.

1 7. A scheduling method for implementing peak service distance
2 as recited in claim 1 wherein the step responsive to identifying no more
3 frames to be dispatched from said flow, of utilizing said NPTV indicator to
4 identify said calendar for attaching said flow upon said new frame arrival for
5 said flow includes the steps of checking for said NPTV indicator being set,
6 and responsive to said NPTV indicator being set, of checking whether said
7 calculated next PSD time (NPT) value for said flow has been passed.

1 8. A scheduling method for implementing peak service distance
2 as recited in claim 7 include the steps responsive to said calculated next
3 PSD time (NPT) value for said flow having been passed, of attaching said
4 flow to a weighted fair queue (WFQ) ring utilizing a queue distance
5 calculation.

1 9. A scheduling method for implementing peak service distance
2 as recited in claim 7 include the steps responsive to said calculated next
3 PSD time (NPT) value for said flow not having been passed, of attaching
4 said flow to a peak bandwidth service (PBS) calendar utilizing said
5 calculated next PSD time (NPT) value for said flow.

1 10. A scheduler for implementing peak service distance (PSD)
2 using a next peak service distance time violated (NPTV) indication
3 comprising:
4 a queue manager;
5 memory coupled to said queue manager for storing flow queue control
6 block (FQCB) information for each of a plurality of flows to be serviced and
7 for storing frame control block (FCB) information for said flows; said FQCB
8 information including QoS parameters for each flow including the peak
9 service distance (PSD) and a queue distance (QD);
10 a plurality of calendars coupled to said queue manager for scheduling
11 flows;
12 a winner partition for arbitrating between said calendars and rings for
13 identifying a flow for servicing and dispatching a frame from said identified
14 flow;
15 said queue manager for checking for a next PSD time (NPT) for said
16 identified flow being violated;
17 said queue manager being responsive to an identified said next PSD
18 time (NPT) being violated for said identified flow, for setting a NPTV
19 indicator;
20 said queue manager being responsive to an identified said next PSD
21 time (NPT) not being violated for said identified flow, for resetting said NPTV
22 indicator for said identified flow;
23 said queue manager for calculating a next PSD time (NPT) value for
24 said identified flow;
25 said queue manager for checking for more frames to be dispatched
26 from said identified flow; and
27 said queue manager responsive to identifying no more frames to be
28 dispatched from said flow, for utilizing said NPTV indicator to identify one of
29 said plurality of calendars for attaching said flow upon a new frame arrival for
30 said identified flow.

1 11. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 10 include a memory manager coupled to said queue
3 manager for coordinating accesses to said memory.

1 12. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 10 wherein said plurality of calendars coupled to said queue
3 manager for scheduling flows include a weighted fair queue (WFQ) ring and
4 a peak bandwidth service (PBS) calendar.

1 13. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 12 wherein said queue manager responsive to identifying no
3 more frames to be dispatched from said flow, for utilizing said NPTV
4 indicator to identify one of said weighted fair queue (WFQ) ring and said
5 peak bandwidth service (PBS) calendar for attaching said flow upon a new
6 frame arrival for said identified flow.

1 14. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 13 wherein said queue manager for checking for said NPTV
3 indicator being set, and responsive to said NPTV indicator not being set,
4 attaching said flow to said weighted fair queue (WFQ) ring upon a new frame
5 arrival for said identified flow.

1 15. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 13 wherein said queue manager for checking for said NPTV
3 indicator being set, and responsive to said NPTV indicator being set, for
4 whether said calculated next PSD time (NPT) value for said flow has been
5 passed.

1 16. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 15 wherein said queue manager responsive to said
3 calculated next PSD time (NPT) value for said flow having been passed, for
4 attaching said flow to said weighted fair queue (WFQ) ring upon a new frame
5 arrival for said identified flow.

1 17. A scheduler for implementing peak service distance (PSD) as
2 recited in claim 15 wherein said queue manager responsive to said
3 calculated next PSD time (NPT) value for said flow not been passed, for
4 attaching said flow to said peak bandwidth service (PBS) calendar upon a
5 new frame arrival for said identified flow.

1 18. A computer program product for implementing peak service
2 distance (PSD) in a scheduler, said computer program product including a
3 plurality of computer executable instructions stored on a computer readable
4 medium, wherein said instructions, when executed by said scheduler, cause
5 said scheduler to perform the steps of:
6 identifying a flow for servicing and dispatching a frame from said
7 identified flow;
8 checking for a next PSD time (NPT) being violated for said flow;
9 responsive to identifying said next PSD time (NPT) being violated for
10 said dispatched flow, setting a next peak service distance time violated
11 (NPTV) indicator;
12 responsive to identifying said next PSD time (NPT) not being violated
13 for said dispatched flow, resetting said NPTV indicator;
14 calculating a next PSD time (NPT) value for said flow;
15 checking for more frames to be dispatched from said flow; and
16 responsive to identifying no more frames to be dispatched from said
17 flow, utilizing said NPTV indicator to identify a calendar for attaching said
18 flow upon a new frame arrival for said flow.

1 19. A computer program product for implementing peak service
2 distance (PSD) in a scheduler as recited in claim 18 wherein said
3 instructions, when executed by said scheduler, cause said scheduler to
4 perform the steps responsive to identifying no more frames to be dispatched
5 from said flow, of utilizing said NPTV indicator to identify said calendar for
6 attaching said flow upon a new frame arrival for said flow cause the
7 scheduler to perform the steps of identifying said NPTV indicator not being
8 set and attaching said flow to a weighted fair queue (WFQ) ring utilizing a
9 queue distance calculation.

1 20. A computer program product for implementing peak service
2 distance (PSD) in a scheduler as recited in claim 18 wherein said
3 instructions, when executed by said scheduler, cause said scheduler to
4 perform the steps responsive to identifying no more frames to be dispatched
5 from said flow, of utilizing said NPTV indicator to identify said calendar for
6 attaching said flow upon a new frame arrival for said flow cause the
7 scheduler to perform the steps of identifying said NPTV indicator being set;
8 checking whether said calculated next PSD time (NPT) value for said flow
9 has been passed; responsive to said calculated next PSD time (NPT) value
10 for said flow having been passed, attaching said flow to a weighted fair
11 queue (WFQ) ring utilizing a queue distance calculation; and responsive to
12 said calculated next PSD time (NPT) value for said flow not having been
13 passed, attaching said flow to a peak bandwidth service (PBS) calendar
14 utilizing said calculated next PSD time (NPT) value for said flow.